



## UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Washington, D.C. 20591-0000 • (703) 305-8000 • FAX (703) 305-8000  
www.uspto.gov  
888-777-USPTO

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/736,043	12/12/2000	Yue Kao	017575-0414 (LAMUS)	7225-15291

5500  
12-13-2002

Baker Botts L.L.P.  
2001 Ross Avenue  
Dallas, TX 75201-2980

[REDACTED] EXAMINER

COLEMAN, WILLIAM D

ART UNIT	PAPER NUMBER
2823	

DATE MAILED: 12-13-2002

Please find below and/or attached an Office communication concerning this application or proceeding.

09/736,043

KUO YUE

Examiner

Art Unit

W. David Coleman

2823

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
 Period for Reply

### A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply, beyond the statutory period, be filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
  - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
  - Failure to reply within the set or extended period for reply will by statute cause the application to become ABANDONED. 35 U.S.C. § 133.
  - Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may, because an earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) Responsive to communication(s) filed on 06 November 2002.
- 2a) This action is FINAL.      2b) This action is non-final
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) Claim(s) 1-5 and 7-32 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-5 and 7-32 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on \_\_\_\_\_ is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) The proposed drawing correction filed on \_\_\_\_\_ is: a) approved b) disapproved by the Examiner.  
 If approved, corrected drawings are required in reply to this Office action.
- 12) The oath or declaration is objected to by the Examiner.

### Priority under 35 U.S.C. §§ 119 and 120

- 13) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application)  
 a) The translation of the foreign language provisional application has been received.
- 15) Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

### Attachment(s)

- |  |  |
|--|--|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)                             | 4) <input checked="" type="checkbox"/> Interview Summary (PTO-413) Paper No(s) _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)         | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)          |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ | 6) <input type="checkbox"/> Other  |

## **DETAILED ACTION**

### ***Information Disclosure Statement***

1. The information disclosure statement filed July 1, 2002 fails to comply with 37 CFR 1.98(a)(2), which requires a legible copy of each U.S. and foreign patent; each publication or that portion which caused it to be listed; and all other information or that portion which caused it to be listed. It has been placed in the application file, but the information referred to therein has not been considered.

### ***Response to Amendment***

2. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.

### ***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-4, 7-11, 13-20 and 22-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner et al., U.S. Patent 5,350,484 in view of Allen et al., U.S. Patent 5,736,002.

5. Pertaining to claims 1, 11 and 18, Gardner discloses a semiconductor process substantially as claimed. See **FIGS. 2A-2C**, where Gardner teaches a method for forming a conductive pattern for a semiconductor device comprising:

patterning a mask layer **4** outwardly from a conductive layer **3** of the semiconductor device, the patterning defining portions **6** of the conductive layer **3** where vias through the conductive layer **3** are desired;

exposing the semiconductor device to a plasma **10**, the plasma converting the unmasked portions of the conductive layer **3** into a compound **8**; and

exposing the semiconductor device to a treatment process, the treatment process selectively removing the compound (column 8, lines 22-27). However, Gardner fails to teach wherein exposing the semiconductor device to a treatment comprises:

exposing the semiconductor device to a substantially inert atmosphere; and

heating the semiconductor device to between 300 and 800 degrees Celsius while the semiconductor device is exposed to the substantially inert atmosphere to remove the compound.

Allen teaches wherein exposing the semiconductor device to a treatment comprises:

exposing the semiconductor device to a substantially inert atmosphere; and

heating the semiconductor device to between 300 and 800 degrees Celsius while the semiconductor device is exposed to the substantially inert atmosphere to remove the compound.

See columns 9 and 10 where Allen teaches wherein exposing the semiconductor device to a treatment comprises:

exposing the semiconductor device to a substantially inert atmosphere; and

heating the semiconductor device to between 300 and 800 degrees Celsius while the semiconductor device is exposed to the substantially inert atmosphere to remove the compound (please note that Allen teaches vaporizing copper up to 2000 degrees Celsius and therefore meets the claim limitations). In view of Allen, it would have been obvious to one of ordinary skill in the art to incorporate the process steps of Allen into the Gardner semiconductor process because in theory, copper chloride, copper fluoride and copper oxide can all be selectively removed from copper by vaporization (column 9, lines 54-58).

6. Pertaining to claims 2 and 28, Gardner teaches wherein the conductive layer **3** comprises a copper material (column 6, lines 55-56).

7. Pertaining to claim 3, Gardner teaches removing the mask layer **4** from the semiconductor device **1**.

8. Pertaining to claims 4 and 20, Gardner teaches removing the mask layer **4** after removing the compound **8**.

9. Pertaining to claims 7 and 15, Gardner teaches providing a barrier layer **2** between the conductive material **3** and the substrate (not numbered).

10. Pertaining to claims 8 and 14, Gardner teaches wherein the conductive material **3** comprises a copper material, and wherein exposing the semiconductor device to a plasma **10** comprises exposing the semiconductor device to a chlorine-containing gas (column 7, line 26).

11. Pertaining to claims 9, 23, 24, 25, 26, 29 and 30, Gardner teaches wherein the compound comprise a copper chloride material **8**, and wherein exposing the semiconductor device to a treatment process comprises exposing the semiconductor device to a hydrogen chloride solution to remove the copper chloride material (See table III).

12. Pertaining to claims 10, 17 and 19, Gardner teaches wherein the mask layer comprises a photoresist material **5**.

13. Pertaining to claim 13, Gardner teaches wherein forming a conductive layer **3** comprises forming a copper layer outwardly from the substrate.

14. Pertaining to claims 16, 22 and 27, Gardner teaches wherein exposing the electronic device to a plasma comprises controlling the exposure of the electronic device to the plasma **10** to form a substantially perpendicular interface between the masked conductive material **3** and the compound **8**.

15. Claims 5, 12 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gardner et al., U.S. Patent 5,350,484 in view of Allen et al., U.S. Patent 5,736,002 as applied to claims 1-4, 7-11, 13-20 and 22-30 above.

16. Gardner teaches a semiconductor process substantially as claimed, however, Gardner fails to teach the selection of removing the masking layers before removing the compound. Applicant is reminded that selection of any order of performing process steps is *prima facie* obvious in the absence of new or unexpected results. *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946). However, in the absence of new or unexpected results, the mere reversal of the order of performing process steps has been held to be *prima facie* obvious. *In re Burhans*, 154 F.2d 690, 69 USPQ 330 (CCPA 1946).

#### *Claim Rejections - 35 USC § 102*

17. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

18. Claims 31 and 32 are rejected under 35 U.S.C. 102(b) as being anticipated by Allen et al., U.S. Patent 5,736,002.

19. Pertaining to claim 31, see **FIGS. 2, 3 and 4A**, where Allen discloses a method for forming a conductive pattern for a device, comprising:

patterning a mask layer **240** outwardly from a conductive layer **420** of the device, the patterning defining portions of the conductive layer where vias through the conductive layer are desired;

exposing, by plasma (column 9, line 28) deposition reactor, the device to a plasma, the plasma converting the unmasked portions of the conductive layer into a compound (i.e., copper chloride); and

exposing the device to a treatment process, the treatment process selectively removing the compound (column 9, lines 27-58).

Pertaining to claim 32, Allen teaches a method for forming a conductive pattern for a device, comprising:

patterning a mask layer outwardly from a conductive layer of the device, the pattern defining portions of the conductive layer where vias through the conductive layer are desired;

exposing the device to a low energy plasma (please note that the term "low energy" is a relative term), the plasma converting the unmasked portions of the conductive layer into a compound; and

exposing the device to a treatment process, the treatment process selectively removing the compound.

***Conclusion***

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to W. David Coleman whose telephone number is 703-305-0004. The examiner can normally be reached on 9:00 AM-5:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael M. Fahmy can be reached on 703-308-4918. The fax phone numbers for the organization where this application or proceeding is assigned are 703-308-7722 for regular communications and 703-308-7721 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

W. David Coleman  
Examiner  
Art Unit 2823

WDC  
November 27, 2002

*WDC*